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ABSTRACT

Presented to the Ninth Annual Interdisciplinary UAP-USC Conference on Piagetian Theory and the Helping Professions in 1979, the paper discusses the development of cognitive skills in handicapped children through art activities, and describes some new art-based procedures for assessing and developing such cognitive skills. The procedures in the program deal with conceptual sequential, and spatial skills and are designed to substitute for language in receiving, processing, and expressing abstract concepts that are fundamental to mathematics and reading (i.e., the concepts of space, sequential order, and class). Based on the hypothesis that children who are deficient in linguistic processing may be able to use spatial processing to solve problems and develop concepts, these procedures are designed to stimulate abstract thinking and reasoning and to develop readiness for mathematics and language. Three studies are described, in which handicapped children showed significant gains in expressing concepts of space, crder, and class as a result of these new art procedures. (DLS)

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DEVELOPING COGNITIVE SKILLS IN HANDICAPPED CHILDREN THROUGH ART

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When children have handicaps that interfere with learning, we are often so preoccupied with their limitations that we lose sight of their strengths. Some skills can be developed in spite of impairments,other skills develop because of impairments, and can equal and even excel those of any normal child. As Rene Dubos has observed, one of the most important laws of biology is that the many potentials of a cell usually become manifest only when it is compelled to use them. The many potentials of a handicapped child may also become manifest only when disabilities compel their use.

One such potential, often overlooked, is the ability to represent thoughts and feelings through visual forms. There is evidence that imagery is a basic instrument in thinking for some normal adults. For the child who has difficulty learning language, imagery may serve to bypass verbal weaknesses and capitalize on visual strengths. Another such potential is the ability to generalize from experiences and to transfer learning from one situation to another.

Children who cannot learn language in the usual way are often deficient in intellectual functioning. Their education traditionally centers around language development. It is generally assumed that the cause of their deficiency is language retardation, but this may be misleading. Language is obviously related to thinking, but whether or not language is essential to thinking is open to question.

There is considerable evidence in recent scientific literature that language and thought develop independently, that language follows rather than precedes logical thinking, and that, even though language expands and facilitates thought, high level thinking can and does proceed without it.

A recurrent theme in the writing of Jean Piaget is that logical thinking exists before the appearance of language, which occurs around the middle of the second year.

Furth reviewed over fifty empirical studies comparing performances of deaf and hearing populations on conceptual tasks involving both abstract and concrete material, as well as tasks involving memory and visual perception. He concluded that intellectual ability is largely independent of language. He also observed that learning language does not require high intelligence, since a four-year-old child can master language, even though some individuals deaf from birth do not acquire competence (Furth, 1966).

Sinclair-de-Zwart, a linguist who originally thought that the operational level of children would reflect their linguistic level, performed two experiments to determine the relationships between these levels in children ages five to eight. She established two groups: conservers, who realized that when liquid was poured from one glass to a glass of another shape the quantity did not change;and nonconservers, who judged the quantity according to the appearance of the containers. In her first experiment she asked the children to describe simple objects. She found that the conservers kept in mind both objects at once while the nonconservers failed to do so. In her second experiment she taught the non-

conservers to describe the objects in the same terms used by the conservers, then examined them to see whether this training had affected their development. In every case there was only mininal progress after linguistic training, and she concluded that language is not the source of logic, but is on the contrary structured by logic (Sinclair-de-Zwart,1969). If so, the usual assumption of causal relationships may be reversed. It is usually assumed that improving a child's language will improve his thinking, but higher levels of thinking may be the cause as well as the consequence of improved language skills, and nonverbal procedures may cause levels of language to rise.

In the thinking of a normal child, the function of language is primarily to pin down his perceptions, organize his experiences, and understand and control his environment, according to Strauss and Kephart. By labeling his perceptions with a word, the hearing child can make them usable again and again. In addition, language opens up the whole field of vicarious experience. When he cannot obtain a desired result he can substitute words for the unsuccessful adtivity, and by symbolizing it, obtain it imaginatively without having to lift a finger, so to speak. Furthermore, by hearing about the experiences of other people he can obtain information that otherwise he would have to obtain by himself. He can compare himself with others, and use the experiences of others, without having to have the experiences himself (Strauss and Kephart, 1955)

Can art symbols take over some of the functions of language symbols in the thinking of a language-impaired child? Like language symbols, art symbols are a way of labeling perceptions and imagining experiences. They can represent particular subjects or

classes of subjects. For example, a painting of a man can represent the painter's father, or authority figures in general, or Man in the abstract, or all three, just as the word "man" can represent each or all of these ideas, depending on the verbal context. The child with inadequate language is handicapped in representing his thoughts effectively, but even though his capacity for language may be impaired, his capacity for symbolizing may be intact, and he may be able to represent his thoughts nonverbally by drawing them. We have attempted to determine whether handicapped children can learn through art, concepts that are usually transmitted through language.

The Cognitive Skills Under Consideratio-

The art procedures that we have been using have been attempts to develop in children three concepts said to be basic in mathematics and reading as well as important in everyday life.
These are first, the concepts of a class of group of objects; second, concepts of space; and third, concepts of sequential order.

Piaget cites three concepts found by the Bourbaki group of mathematics in an attempt to isolate the fundamental structures of mathematics. They found three independent structures, i.e. not reducible to one another, from which all mathematical structures can be generated. One structure is based on ideas of space and applies to neighborhoods, borders, points of view, and frames of reference. A second structure is based on the idea of a group and applies to numbers and classifications. The third is based on ideas of sequential order and applies to relationships.

Although these ideas are usually developed through language, they can also be perceived and interpreted visually, and although they may seem highly abstract, Piaget has found them in primitive form in the thinking of unimpaired children as young as six or seven.

The art procedures are based on these three structures as well as on observations by Piaget and Inhelder, and by Bruner and his associates, who have traced the development of cognition through successive stages by presenting children with various tasks. Their tasks were more or less dependent on language since the investigators were concerned with normal rather than handicapped children, but their tasks can easily be adapted to art activites and their observations about stages of development enable us to compare handicapped with normal children.

The same three structures found basic in mathematics may also be basic in reading. They appear, in slightly different form, in recent studies by investigators concerned with learning disablities who seem to be on the same trail, having come from another direction.

One of these investigators, Bannatyne, found that children with dyslexia usually obtain higher scores on certain WISC subtests which, as a group, involve manipulating objects in space without sequencing. He suggested that the three subtests - Picture Completion, Block Design, and Object Assembly - formed a special category which he called Spatial Ability. Bannatyne also found that dyslexic children do reasonably well in three WISC Subtests of Similarities, Comprehension, and Vocabulary - his Conceptual category that involves ability to manipulate spatial images concept-

ually. In one study involving 87 learning disabled children, ages 8 to 11, he found that 70% had spatial scores greater than their conceptual scores and since the WISC Test is standardized, only 50% of normal children would have spatial scores greater than their verbal conceptual scores (1971).

He also found that these children almost always do worst on WISC subtests involving ability to sequence (Arithmetic, Coding, and Digit Span - his Sequencing category).

Bannatyne reasoned that it would be useful to regroup the subtests into Spatial, Conceptual, and Sequential categories rather than the traditional Verbal and Performance categories, and subsequent studies by other investigators have supported his hypothesis and confirmed his findings.

Rugel reviewed 25 studies of WISC Subtest scores of disabled readers, reclassifying the subtests into Spatial, Conceptual, and Sequencing categories. He found that disabled readers scored highest in Spatial ability, intermediate in Conceptual ability, and lowest in Sequencing ability, thus supporting Bannatyne's hypothesis (1974).

Smith and his associates administered the WISC-R test to 208 school-verified learning disabled children. Recategorizing the subtests in the manner suggested by Bannatyne, they too found validation for Bannatyne's arrangement. The mean Spatial score obtained was significantly greater than the mean Conceptual score, which, in turn, exceeded the Sequential scores (1977).

Their findings suggest that learning disabled children are characterized by the same pattern of abilities that Bannatyne

found for children with dyslexia and that Rugel found for disabled readers in general.

In discussing the significance of finding that these children possess in common high visuo-spatial skills, moderate conceptual skills, and low sequential skills, these investigators note that a cognitive approach to diagnosis and remediation has received little attention compared to perceptual and psycholinguistic approaches. They suggest that the time may now be ripe for serious consideration of the cognitive approach.

The time may also be ripe for serious consideration of the role of art in the cognitive approach. As Bannatyne observed, learning disabled children have intellectual abilities of a visuo-spatial nature that are not being recognized, allowed for or trained since the emphasis is usually on linguistic rather than visuo-spatial education.

The art procedures that we have been using in our program deal with conceptual, sequential and spatial skills. Drawing from imagination involves ability to select, combine, and represent ideas in a context. Drawing from observation involves ability to percieve and represent spatial relationships. Predictive drawing, painting, and modeling clay all involve ability to represent spatial concepts and to order sequentially. The procedures are designed to stimulate abstract thinking and reasoning and to develop readiness for mathematics and language. They are basedon the hypothesis that children who are deficient in linguistic processing may be able to use spatial processing to solve problems and develop concepts.

Our Three Previous Studies

The teaching and testing procedures were initially developed in a 1972-3 State Urban Education Project in which one teacher worked with an experimental group of 34 children. They were a randomly selected 50% sample of 12 classes in a school for language and hearing impaired children. The remaining 34 children served as controls. Since all classes in the school were limited to 8 children, there were 4 children in each art class, held once a week for 11 weeks in the fall and 9 weeks in the spring. To compare handicapped with normal children, the tests were also administered to normal children in a suburban public school.

In the drawing from imagination test, improvement in the experimental group was found at the p .01 level in the combined abilities of selecting, combining, and representing. Comparing scores of the handicapped experimental group with the normal group (N=63), the normal children were superior on the pretest but not quite significantly better. On the post-test, however, the handicapped experimental children (N=34) were significantly superior to the normal children.

In the predictive drawing test, comparing mean scores of the handicapped experimental children before and after the art program, significant improvement was found at the p .01 level. The control group did not improve. Comparing handicapped and normal children, the normal children had significantly better scores on the pretest in both horizontal and vertical orientation. After the art program, however, no significant difference was found in horizontal orientation while in vertical orientation, the handicapped experimental children had improved to a degree to which they were

significantly superior to the normal children.

In drawing from observation, the experimental group improved significantly at the p .05 level. The control group did not improve. Although the normal children had higher scores on the pretest and the handicapped experimental children had higher scores on the posttest, there was no significant difference between the groups. (Silver, 1973).

Although aesthetic goals were not among the stated concerns of the State Project, it was of much concern. Some art educators feel that using art for any purpose other than instruction undermines art education. Some art therapists feel that structuring art experience interferes with spontaneity.

To determine whether aesthetic and therapeutic goals can be pursued concurrently, two judges, a university professor of art and a registered art therapist, were asked to evaluate three drawings or paintings produced by each child in the fall program experimental group (N-18): the child's first work, his last work, and a work produced at mid-term. The fifty-four drawings or paintings were identified only by number and shown in random order to conceal the sequence in which they had been produced.

The judges, working independently, rated each work on a scale of 1 to 5 points for sensitivity and skill, and for ability to represent objects or events at the level of description (imitative, learned, impersonal) 1 point, the level of restructuring (going beyond description to elaborate or edit an experience- 3 points), or at the level of transformation (beyond restructuring, highly personal, imaginative, inventive- 5 points).

Of the 18 children, the first drawings of 9 children received

the highest score, 5 points, for being highly personal and imaginative, or highly skillful. In skill and expressiveness combined, both judges found improvements that were significant at the p 0.01 level (Silver, 1978).

Our second study was concerned with the question whether the teaching and testing procedures would be useful with children who had an opposite constellation of disabilities -- visual-motor weaknesses rather than language and hearing impairments, and whether the procedures could be used effectively by teachers other than the one who developed them. Eleven graduate students,who had registered for a course in using the art procedures , worked under supervision with 11 children. The children were not systematically selected but were enrolled as their applications were received. After ten one-hour art classes, the children improved significantly in the three areas of cognition: at the p .01 level in drawing from imagination, at the p.05 level in drawing from observation, and at the p.01 level in sequential ordering (i.e., ordering a matrix) (Silver and Lavin, 1977).

In our third study in the Spring semester, 1978, another group of 11 graduate students worked under supervision with 11 children in a suburban public school. Selected by school administrators for having special educational needs, these children also showed significant gains in the three areas of cognition: at the p.01 level in drawing from imagination, and at the p.05 level in both predictive drawing and drawing from observation. Thus the results reported in the previous study were again verified.

The experimental techniques have been used successfully in these investigations. Most of these studies involved small groups and had no control group subjects.

This area of research into developing and evaluating the cognitive skills of handicapped children has yielded very encouraging results.

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